656.00 TRAFFIC SIGNAL INSTALLATIONS

General

This work is very specialized requiring the services of a licensed electrical Contractor. Few inspectors have had sufficient experience to thoroughly and adequately inspect this type of work. To overcome this problem, it is recommended that the District Signal Electrician or electrician work closely with project personnel to assure plan and specification compliance.

Experience has proven that many potential problems can be averted or minimized by a special pre-operational meeting involving the electrical Contractor or subcontractor, project personnel, and the Signal Shop Superintendent or District Signal Electrician. This special pre-operational meeting should be held immediately prior to starting the electrical work. It is especially important that the Contractor's job Superintendent or Foreman attend this meeting. The conduct of the meeting should be informal and cover the real "nuts and bolts" problems that may be expected or that have occurred on previous projects.

Common Construction Errors

Over the years, a number of recurring construction errors have been discovered regarding electrical work either at final inspections or later when maintenance work was being performed. A list of these more common errors follows. This list is included as a reminder for inspection personnel and should not substitute for the pre-operational meeting where this list of errors should be presented and discussed with the Contractor.

A. Common Conduit Installations Problems

1. Use of plastic conduit for elbows greater than 45° instead of steel (as required) causing conduit to be cut when wire is pulled.
2. Minor bends in conduit without proper use of bending tool causing partial collapse of conduit and resultant problems pulling wire through conduit.
3. Use of rocky material for conduit backfill instead of fine soil/sand results in eventual collapse of conduit.
4. Failure to clean dirt and moisture from conduit prior to pulling wire.
5. Failure to cap stub/free ends of conduit resulting in intrusion of soil and moisture.
6. Conduit buried at less than required 24 in. (0.6 m) depth causing future maintenance problems, such as inadvertent cutting or mashing of conduit.
7. Placement of conduit by other than a certified licensed electrical Contractor. This can result in rejection by the State Electrical Board.
8. Placement of conduit at locations other than shown on the plans without proper indication on the as-constructed plans.

B. Common Foundations Problems

1. Improper or wrong size anchor bolts installed or installed out of alignment for proper pole base plate fit.

2. Foundation not set at proper elevation.
3. Improper backfilling or lack of mechanical tamping around foundation may result in eventual tipping of the foundation and pole.
4. Failure to grout under the base of pole.
5. Improper placement of structural concrete per section 502.03 (exceeds 5 ft. max drop).
6. Improper size of signal cabinet foundation installed. This is a common problem with projects that have multiple signal installations and it is assumed that all cabinets take the same foundation.

C. Common Pole Erection Problems

1. Rotation of signal mast arm 180^{o} from designed position resulting in a drooping instead of a raked appearance.
2. Failure to accurately plumb poles after all hardware is in place.
3. Failure to properly tighten fasteners.
4. Failure to clean or chase internal threads, prior to component attachment.

D. Common Expansion Fittings Problems

1. Failure to install a proper conduit expansion unit at structure expansion joints.
2. Failure to provide expansion couplings on long runs of plastic conduit may result in buckling of the conduit.

E. Common Wiring Problems

1. Failure to use a wire lubricant prior to pulling through conduit may damage the wire, its insulation, or the conduit.
2. Use of extreme force and speed to pull wire such as with a vehicle may damage wire, its insulation, or the conduit.
3. Failure to pull signal cable by hand may damage insulation due to the sharp bends normally required in signal installations.
4. Unauthorized splices in buried or concealed junction boxes that create future maintenance problems.
5. Failure to use insulated bushings at conduit entrances to metal junction boxes, cabinets, etc. will scuff insulation from the wire when it is pulled.
6. Unauthorized splices in signal cables (signal head wiring, video or loop detection). The specifications allow no splices, as splices are a common source of problems in signal installations. The cable must be continuous between terminal connections.
7. Use of wrong type or size of wire or wire with improper insulation.
8. Failure to use approved wire connectors and insulated splice kits.

F. Common Signal Loop Wiring Problems

1. Improper splicing of signal loop detector lead-in wire which may break down causing moisture to enter the splice and ground the loop making it inoperable.

2. Improper use of shielded conductors for loops.
3. Use of a loop lead-in wires other than the approved type.
4. Allowing the Contractor to use a sharp instrument, such as a screwdriver, to force loop wire into the sawed slot causing damage to the wire or insulation.
5. Use of a tar or asphalt sealer which are not approved for use on loops and splices.
6. Use of non-approved loop sealant.
7. Slots sawn for loop detectors, not wide enough for proper embedment in sealant.
8. Loop system testing not being recorded and certified on ITD form #2698

G. Common Video Detection Problems

1. No site review by manufacturer's representative(s).
2. Improper field of view set in camera.
3. Improper detection zones in configurations. Must be per the detector loop spacing plan (Standard Drawing I-5.)
4. No consideration for seasonal low sun angles.
5. No follow up to confirm operation during dusk to dawn operation.

H. Common Interconnection Problems

1. Fiber optic interconnect system is not properly installed to control minimum bending requirements of fiber optic cable.
2. A specified length of fiber optic cable is not installed in maintenance loops.

I. Common Grounding Problems

1. Failure to connect poles, junction boxes and other equipment to the service ground by an insulated AWG 8 soft-drawn stranded copper wire.

14-Day Field Test

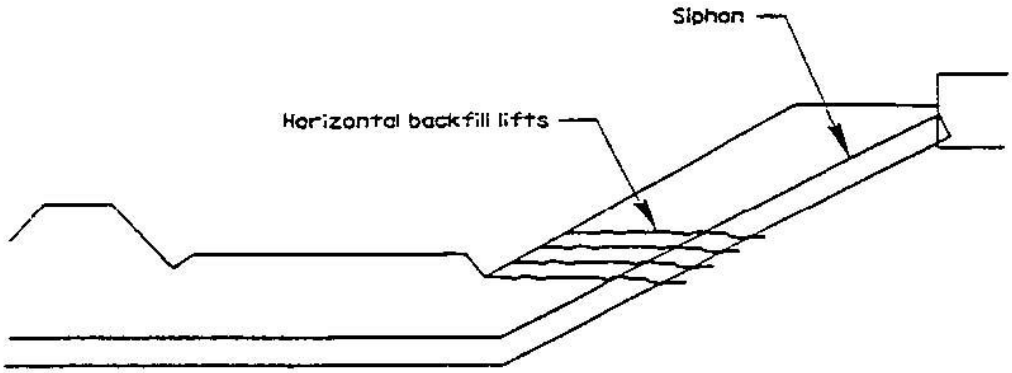
It is the intent of this specification to provide two weeks of standard operation with photocell, manual, or other specified turn-on control. During this test, the Contractor should be responsible for all corrective work resulting from improper installation, workmanship or materials. Following successful completion of the test, the Resident should recommend partial acceptance covering signalization. The cost of power consumed during the test period should be borne by the agency or agencies assigned maintenance responsibility by the cooperative project agreement.

Documentation for Pay Quantities

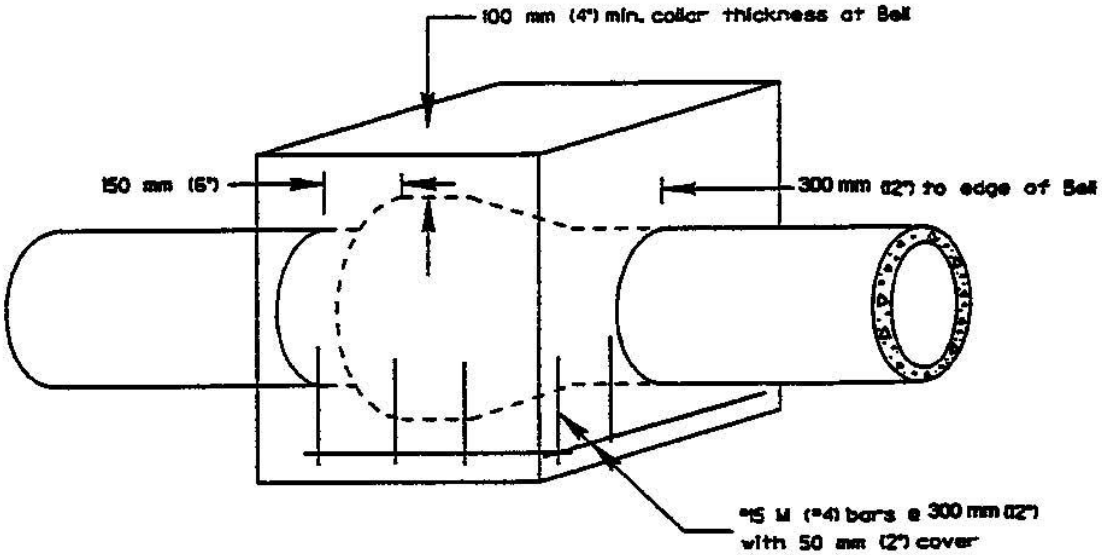
The diary shall be used to verify the activity, date, and location of the work.

Reports

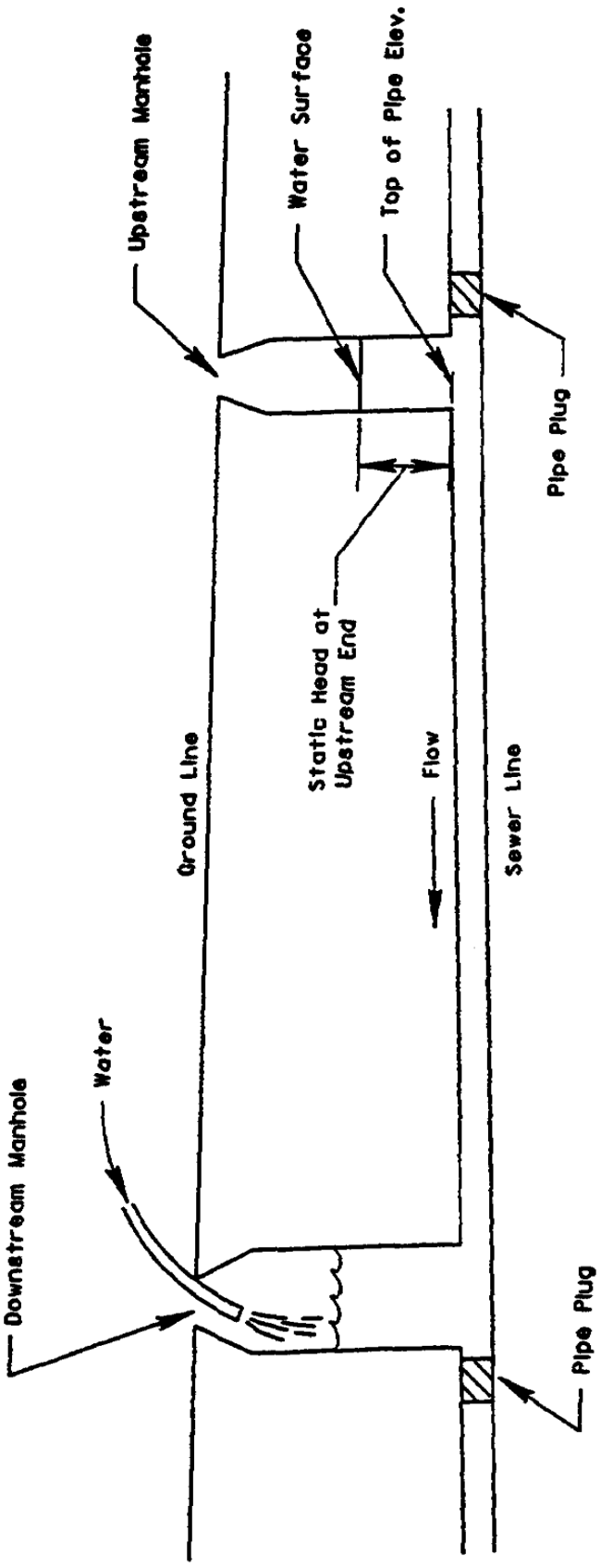
None.



Backfill of Siphon Section in Back Slope



Repair of Joint with Concrete Collar



Testing Sewer Pipe Line